CLAIMS

1. A combustor and a combustor cap liner assembly, comprising:

a combustor having a combustor casing and a combustion liner within the combustor casing, wherein the combustion liner is closed at a forward end by the combustor liner cap assembly, the combustor including a cellular solid media disposed within the combustor liner cap assembly and/or between the combustion liner cap assembly and an end cover to the combustor.

2. The combustor and a combustor cap liner assembly of Claim 1, wherein comprising the cellular solid media in the combustion liner cap assembly is disposed about at least one burner tube extending through the combustion liner cap assembly.

3. The combustor and a combustor cap liner assembly of Claim 1, wherein the cellular solid media comprises at least a ceramic material, a metallic material, or a combination thereof.

4. The combustor and a combustor cap liner assembly of Claim 1, wherein the cellular solid media comprises an open cell metal foam media, an open cell ceramic foam media, a closed cell foam, a reticulated foam having both closed cells and open cells, a lattice block structure, or a cellular alloy.

5. The combustor and a combustor cap liner assembly of Claim 1, wherein the cellular solid media is an aerogel.

6. The combustor and a combustor cap liner assembly of Claim 1, wherein the cellular solid media comprises a metal alloy and/or superalloy material.

7. The combustor and a combustor cap liner assembly of Claim 6, wherein the metal alloy and or super alloy comprises a metal selected from the group consisting of chrome, aluminum, cobalt, nickel, iron, tungsten, molybdenum, and titanium.

8. The combustor and a combustor cap liner assembly of Claim 1, wherein the cellular solid media has a density less than or equal to about 50 percent relative to a bulk density of the media.

9. The combustor and a combustor cap liner assembly of Claim 1, wherein the cellular solid media has a density of about 3 percent to about 10 percent relative to the density of a bulk nonporous solid with the same chemical composition as that of the cellular solid media.

10. The combustor and a combustor cap liner assembly of Claim 1, wherein the cellular solid media has a pore density greater than about 5 pores per inch.

11. The combustor and a combustor cap liner assembly of Claim 1, wherein the cellular solid media disposed within the combustor liner cap assembly and/or between the combustion liner cap assembly and the end cover comprises multiple discs of the media having different porosities.

12. The combustor and a combustor cap liner assembly of Claim 1, wherein the cellular solid media disposed within the combustor liner cap assembly and/or between the combustion liner cap assembly and the end cover comprises a single disc.

13. The combustor and a combustor cap liner assembly of Claim 1, wherein the cellular solid media comprises a ceramic material.

14. The combustor and a combustor cap liner assembly of Claim 1, wherein the cellular solid media comprises a ceramic material comprising silica, alumina, zirconia, ytrria stabilized zirconia, or combinations comprising at least one of the foregoing.

15. A combustor and a combustor cap liner assembly comprising:

a combustor having a combustor casing and a combustion liner within the combustor casing, wherein the combustion liner is closed at a forward end by the combustor liner cap assembly, the combustion liner cap assembly comprising a cellular solid media in a space defined by opposing surfaces of a circular plate, a burner tube, and an effusion plate of the combustion liner cap assembly.

16. The combustor and a combustor cap liner assembly of Claim 15, wherein the cellular solid media comprises a ceramic material, a metal material or a combination thereof.

17. The combustor and a combustor cap liner assembly of Claim 15, wherein the cellular solid media is an aerogel.

18. The combustor and a combustor cap liner assembly of Claim 15, wherein the cellular solid media comprises a metal alloy and/or superalloy material.

19. The combustor and a combustor cap liner assembly of Claim 18, wherein the metal alloy and or super alloy comprises a metal selected from the group consisting of chrome, aluminum, cobalt, nickel, iron, tungsten, molybdenum, and titanium.

20. A combustor and a combustor cap liner assembly comprising:

a combustor having a combustor casing and a combustion liner within the combustor casing, wherein the combustion liner is closed at a forward end by the combustor liner cap assembly, the combustion liner cap assembly consisting essentially of a cellular solid media having annularly arranged burner tube openings therethrough for supporting a burner tube extending therethrough.

21. The combustor and a combustor cap liner assembly of Claim 20, wherein the cellular solid media comprises a ceramic material, a metal material, or a combination thereof.

22. The combustor and a combustor cap liner assembly of Claim 20, wherein the cellular solid media is an aerogel.

23. The combustor and a combustor cap liner assembly of Claim 20, wherein the cellular solid media comprises a metal alloy and/or superalloy material.

24. The combustor and a combustor cap liner assembly of Claim 23, wherein the metal alloy and or super alloy comprises a metal selected from the group consisting of chrome, aluminum, cobalt, nickel, iron, tungsten, molybdenum, and titanium.

25. A process for reducing noise emissions in a combustor of a gas turbine, comprising:

disposing cellular solid media within the combustor in an amount and at locations effective to reduce the noise emissions relative to the combustor without the foam; and

operating the gas turbine.

26. The process for reducing noise emissions according to Claim 25, wherein the cellular solid media is disposed in a combustion liner cap assembly within the combustor.

27. The process for reducing noise emissions according to Claim 25, wherein the cellular solid media is disposed in the combustion liner cap assembly in a space defined by a circular plate, an annular end body extending from the circular plate, and a burner tube supported by and disposed in an opening in the circular plate.

28. The process for reducing noise emissions according to Claim 25, wherein the cellular solid media comprises a ceramic material, a metal material, or a combination of open cell metal foam media and open cell ceramic foam media.

29. The process for reducing noise emissions according to Claim 25, wherein disposing the cellular solid media in the combustion liner cap assembly comprises arranging multiple discs of the cellular solid media in the combustion liner cap assembly, wherein the multiple discs have the same or different porosities.